06/01/99

INSTALLATION OF THE

E-AREA VADOSE ZONE MONITORING SYSTEM PHASE 1A

We completed installation of the vadose zone monitoring instruments around the perimeter of the E-Area disposal trenches. There were 40 instruments (i.e., lysimeters, tensiometers, and water content instruments) that were installed in three vertical holes and four angled holes that reach under the centerline of the trench. The wells were instrumented with data loggers which were programmed and wired to the instruments. Preliminary assessment of the data indicates that many of the instruments have already equilibrated with the moisture in the surrounding backfill. The instrument data will enable determination of the contaminant flux to the groundwater. This effort completes installation of Phase IA of the E-Area Monitoring Program.

Installing Instrument Cluster in Vertical Borehole

The team responsible for the installation included members from five different departments and two DOE sites (i.e., SRS and INEEL). Expertise on the team was diverse to ensure success of the project and was demonstrated in characterization, drilling, installation, and knowledge of vadose zone monitoring technologies.

- Characterization – First, the geology beneath the E-Area disposal trenches was characterized using state-of-the art technology that included cone-penetrometer testing. Drilling was also required to obtain core samples of the geology at specified depths beneath the trenches. Experts used the data to develop 3-D models of the geology in the trench area vicinity in order to determine optimum vertical depths for the instruments.

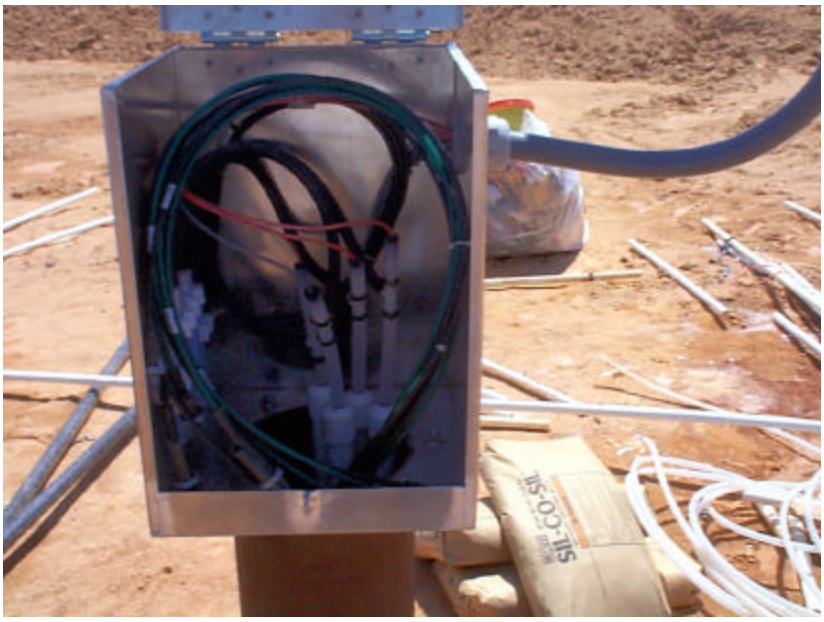
- Drilling - Expertise in drilling techniques was required in order to drill angled holes 35^{o} from the vertical and to drill the large nominal 8-inch vertical holes. Two drilling techniques were used: mud rotary for the angled holes and hollow-stem augering for the vertical holes.

Mud Rotary Drilling of Angled Boreholes

- Installation – The team developed innovative methods for installing the water content reflectometers (WCR) which required contact with the "undisturbed" soil on the sidewall of the borehole. Instrument clusters were assembled in which both the lysimeter and the WCR were attached to the advanced tensiometer access tube. The team also developed an innovative approach for installation of the angled lysimeters. A casing was installed into the angled borehole; the borehole length was then increased approximately 4-feet past the casing to allow the lysimeter to be easily inserted and exposed to the sediments. This installation method will allow easy removal of the lysimeter for future maintenance.

Holding Instrument Cluster (AT, Lysimeter, and Water Content Reflectometer)

Assembling Data Logging Systems with Solar Panels



Installing Surface Casing for the Instruments

- Vadose Zone Technology – Leading scientists in hydrogeology and environmental engineering and monitoring from both SRTC and INEEL participated on the team. The Advanced Tensiometer, one of the instruments installed in the E-Area vadose zone, was developed by two INEEL scientists who were members of this team.

Data from the Advanced Tensiometers and the water content reflectometers are currently being collected and stored in the data loggers. The data indicates that many of the instruments have equilibrated with moisture in the backfill. Weeks or months may be required for the backfill to equilibrate with the water potential/moisture content in the surrounding soils. The lysimeters are installed and samples will be taken during May 1999.